REMARKS

Claims 1-27 are pending while claims 1-18 and 22-27 are rejected, and claims 19-21 have been indicated as being allowed. Applicant cordially thanks the Examiner for indication of the same. Claims are new, leaving claims 1-29 for consideration upon entry of the present amendment. No new matter has been entered.

Specification

The disclosure stands objected to because of the numerous informalities enumerated on pages 3-6 of the Detailed Action. Applicants acknowledge the objections as being substantially the same as discussed during a telephone conference on 16 April 2004, when Applicant's attorney and undersigned authorized a proposed amendment to the specification via an Examiner's Amendment to be entered. Applicant now again authorizes entry of the same. Furthermore, with respect to the objections enumerated on page 6 of the Detailed Action regarding page 55 of the specification, i.e., the Abstract, an amendment thereto is submitted herewith addressing the enumerated objections thereto.

Accordingly, it is respectfully requested that the objection to the specification be withdrawn.

Claim Rejections -35 USC §103

Claims 1-5, 9-13, 18 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lemley (4,338,560). Applicant respectfully traverses.

With respect to claim 1, the Examiner alleges that Lemley in Figure 2 discloses a method for radiating thermal energy from a terrestrial position into deep space comprising arranging a thermal transmitting material over an object not in direct sunlight (col. 1: 6-10), the thermal energy transmitting material positioned to remove waste heat proximate and external the object thereby reducing thermal pollution from a terrestrial position into deep space; and, positioning the thermal energy transmitting material so that a transmitting surface thereof (radiators) faces deep space such that fluid communication therebetween consists of deep space and the transmitting surface, the material having spectral surface properties of high emissivity (radiation

absorptive and radiation emissive material, such as metal) (abs.; Figure 2 showing collectors 10 and radiators 22, both of a **radiation absorptive** and **radiation emissive** material, and coated with a polyester film, and facing earth and deep space, respectively; col. 2:14-68).

The Examiner further alleges as to the recitations "material configured and removably positioned" and "wherein the object includes objects one the surface of the earth and proximate thereto", that Lemley at column 2, lines 38 through column 3, line 5 discloses that the size of the array relative to a vehicle depends upon the amount of power required by the vehicle which also appears to be a function of the altitude and the IR flux on the a body at that altitude (see equation 1). The Examiner states that Lemley suggests a "thermal energy transmitting material configured and removably positioned" on an object proximate the earth depending upon desired size and power requirements.

The Examiner concludes that although Lemley does not specifically recite ..... in a spectral band substantially transparent to the atmosphere of the earth.", that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have expected the material of Lemley to provide the claimed properties as both metals are similar, if not the same, in structure and function.

It is respectfully submitted that Lemley teaches "a **heat-to-electricity** converter, particularly adaptable for use by **high-altitude** platforms such as aerostats and **space stations**, for changing heat energy of radiation from the earth to electric power during day and/or night." (Emphasis added.) See Abstract. "The invention relates generally to . . . converting the earth's albedo, that is infrared radiation of the earth, to direct current (dc) power . . . **for use by high-altitude platforms for propulsion, sensors, or other power requirements**." (Emphasis added.) Col. 1, lines 5-12. Lemley teaches that the earth's horizon at a high altitude, for example 22 kilometers (km) or 70,000 feet, is an attractive altitude for sensor operation. Col. 2, lines 39-41. This is contrary to objects located at the earth's surface or proximate thereto. Furthermore, 70,000 feet is more than double the altitudes that flying aircraft typically travel. Lemley does not teach or suggest arranging a thermal energy transmitting material over an object . . . wherein said object includes objects on the surface of the earth and proximate thereto. Thus, it is respectfully submitted that Claim 1, and the claims depending from Claim 1, i.e., 2-9, 24, 26 and 28, define over Lemley. It is further noted that the expected material of Lemley to provide the

claimed properties in Claim 1 does not cure the deficiencies noted above in Lemley.

Moreover, because the device taught in Lemley is located tens of thousands of feet above the earth's surface, it does not teach thermal interaction by conduction, as Applicant teaches (See new claims 28 and 29). (See Col. 2, lines 38-53). Furthermore, the device taught in Lemley teaches little, if any, convection heat transfer from the earth's surface and /or proximate thereto, to a distance located tens of thousands of feet away (i.e., 70,000 feet) (See new claims 28 and 29). Lemley primarily teaches radiation heat transfer from the earth's surface to a distance located tens of thousands of feet away (i.e., 70,000 feet) for converting this radiation to useful energy at such a high-altitude and discarding any heat energy to deep space. Applicant teaches converting thermal energy from conduction and/or convection energy transfer at the surface of the earth or proximate thereto (e.g., terrestrial position) into radiant thermal energy and transmitting the resulting radiant thermal energy via radiation heat transfer, away from the surface of the earth toward deep space. Lemley teaches a device to convert radiant energy received at a high-altitude to useful energy to sustain an object located at that high-altitude, primarily at night when solar energy is not available. Lemley does not teach a device that affects thermal energy on the surface of the earth or proximate thereto, as the Applicant does. Lemley teaches a different solution to a different problem.

As for Claim 10, which is similar to Claim 1, it is respectfully submitted that Lemley does not disclose, nor make obvious, a thermal energy transmitting material designed to cover an object and positioned with a transmitting surface thereof facing deep space, said transmitting material having spectral surface properties of high emissivity in a spectral band substantially transparent to the atmosphere of the earth, wherein said object includes objects on the surface of the earth and proximate thereto. As discussed above with respect to Claim 1, Lemley limits the energy conversion to high-altitude conversions (i.e., 70,000 feet above the earth's surface). More specifically, Lemley teaches a high-altitude converter of albedo radiation to electrical energy and heat energy for use primarily at night by an object at the same high-altitude. Lemley does not teach or suggest thermal energy transmitting material designed to cover an object on the surface of the earth and proximate thereto. Again, Lemley teaches a different solution to a different problem. Thus, it is respectfully submitted that Claim 10, and the claims which depend from Claim 10, i.e., Claims 11-18, 22, 23, 25, and 27, define over Lemley. It is further noted that the

expected material of Lemley to provide the claimed properties in Claim 10 does not cure the deficiencies noted above in Lemley.

In fact, to reiterate the above arguments in a different manner, the Examiner claims that the Lemley platform is an "object proximate the earth. . . ". Yet Lemley declares that it is used for "converting the earth's albedo", (Col. 1: line 8), that is, the infrared radiation of the earth, to "direct current (dc). . . ", (Col.1:line 9). This cannot be done in a terrestrial position (e.g., close to the surface of the earth). The earth's albedo cannot be "collected" at its surface; it must be done at thousands of feet above the surface - hence non-terrestrial. Indeed, Lemley refers to his device as the "albedo power converter" (Col. 1:line 49). It is respectfully submitted that the Examiner improperly uses hindsight in using the teachings of the present application and superimposes these teachings on the device disclosed in Lemley, only to make an improper contradiction that defies the laws of nature. In particular, the Examiner contradicts himself by claiming that the device of Lemley could be employed at a terrestrial position, yet the device will not work because the prior art of Lemley is using the earth's albedo that must be "collected" thousands of feet above the earth -- not at a terrestrial location.

The device of Lemley operates at 70,000 feet, about 38,000 feet above the Troposphere, which is where the moisture resides in the atmosphere. Above the Troposphere is the Stratosphere, where there is no moisture, only nitrogen, oxygen, argon, ozone and carbon dioxide. Diatomic molecules do not influence the movement of IR energy through it; only the water vapor, ozone and carbon dioxide absorb the IR energy. This absorption only takes place in particular bands (of interest here): carbon dioxide has two strong absorption bands from 4μm to 5μm and 15μm to 20μm; water has two strong absorption bands from 5μm to 8μm and 13μm to 22μm. Ozone has a single, very narrow band at 9.6μm, which influences the movement of IR energy very slightly.

The earth's albedo (radiated energy) is due to reflected solar energy and absorbed, re-emitted solar energy. Therefore the reflected portion of the albedo occurs from objects on the earth's surface as well as off of clouds, and the absorbed portion takes place throughout the atmosphere, but primarily in the Troposphere where the water vapor resides. Therefore, the prior art device of Lemley must be above the Troposphere to take advantage of the earth's albedo from the radiative energy absorbed in the moisture.

Hence an object at the earth's surface (a terrestrial object) cannot utilize this albedo because the net radiation heat exchange is based upon the temperature difference between the two objects. And objects at the earth's surface are typically in relative thermal equilibrium with the surroundings unless there is a source of thermal energy to provide heat or a sink to remove heat. That is, the small temperature difference between the terrestrial objects precludes any significant exchange of energy by radiation.

Lemley's device depends upon this radiative exchange of thermal energy. Lemley clearly teaches "converting the earth's albedo. . . to direct current (dc)". (Col. 1, lines 7-8) Hence, Lemley teaches using radiation heat transfer to collect thermal energy to operate. The instant application utilizes conduction and/or convection to collect thermal energy to operate (See new claims 28 and 29). There may be applications where radiation is used, but typically, the Applicant's device uses convection or conduction heat transfer to function.

From another perspective, Applicant acknowledges that one may attempt to claim that the prior art of Lemley does derive some of its energy from the surrounding atmosphere of the Stratosphere because the Stratosphere is at a higher temperature than deep space. However, this is not true because the radiation (albedo) from the earth's surface is at a higher temperature than the Stratosphere at 70,000 feet. (Note: terrestrial summertime temperature: 290K; terrestrial wintertime temperature: 265K; Stratosphere temperature at 70,000 feet: 220K.) So an energy balance on the collector of Lemley would show that the IR from the earth is heating the collector, and the surrounding atmosphere of the Stratosphere is cooling the collector by convection. This is opposite the effect produced by convection on the instant application; therefore these are certainly not comparable devices. Again, these are contradictory laws of physics. Also, Lemley knows as an artisan that the cooling effect from convection will be small because the density of the atmosphere is very low and not enough heat exchange will take place, except by radiation heat transfer, which is the mode of operation of the Lemley device.

Obviously there are other components in the air including: dust, aerosols (hydrocarbons), pollutants, etc., that will affect the movement of IR energy in the atmosphere. However, their influence is only slight compared to the primary components of oxygen, nitrogen, argon, carbon dioxide and water vapor. Indeed, the other components add to the earth's albedo because they reside primarily in the Troposphere, absorb thermal energy, and re-radiate it. Lemley is using the

earth's albedo to operate. On the contrary, Applicant's device resides at the earth's surface, increasing the earth's albedo to remove waste heat. In fact, the device of Lemley can use the device of the Applicant to improve the operation of the Lemley device. Therefore, it is respectfully submitted that this in itself is a patentable device -- improving current technology.

The Examiner states that Lemley is "positioned to remove waste heat . . . thereby reducing thermal pollution from a terrestrial position. . . ". There is absolutely NO mention of waste heat or thermal pollution in the Lemley prior art. In fact, it is respectfully submitted that the Lemley device is not "sucking" and cannot "suck" the heat from the surface of the earth. Lemley teaches a large platform blocking the view of deep space at 4K - and there is no teaching or suggestion that the platform facing the earth is at 4K, as in deep space. Therefore, the device of Lemley actually hinders the movement of thermal radiation away from the environment of the earth. Hence, the prior art does not teach or suggest reducing thermal pollution - only producing electric power for use on the high-altitude platform. It is respectfully submitted that the earth's albedo absorbed by the device of Lemley cannot be referred to as "waste heat" or "thermal pollution" as the Examiner characterizes it for a claim of obviousness. Lemley does not teach or suggest trying to affect thermal energy on the surface of the earth.

Accordingly, it is respectfully requested that the rejection o claims 1-27 be withdrawn.

With respect to claim 2, the Examiner admits that Lemley does not specifically recite that the terrestrial object is covered with the transmitting material only at intervals during which the object is not in direct sunlight. However, the Examiner argues that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have expected the object to be covered with the transmitting material only at intervals during which the object is not in direct sunlight in light of Lemley's teaching on column 1, lines 5-11 that transmission occurs during day and/or night.

It is respectfully submitted that Lemley's device will work in direct sunlight, so covering during sunlight hours is not an issue. That is specifically why Lemley claims his device will work day or night; this is one of the positive attributes of the prior art. The high-altitude platform on which Lemley's device is functioning can simply be turned away from the sun so the prior art is in the shadow of the platform. That is why Lemley's device can be used day or night.

Therefore, the Examiner's comment that ". . . it would have been obvious to one of ordinary skill. . . the object to be covered with the transmitting material only at intervals during which the object is not in direct sunlight. . ." appears to an improper statement. It is respectfully submitted that it would not be practical to cover and uncover a 214m^2 area at 70,000 feet in the air based on whether the sun is out or not. Therefore it is not an issue of covering or uncovering the platform, but of positioning the platform to be out of direct sunlight.

Accordingly it is respectfully requested that the rejection to claim 2 be withdrawn for this reason as well.

With respect to claim 10, similar to claim 1, Applicant reiterates that the device of Lemley cannot be at a terrestrial position, as Lemley teaches a device at 70,000 feet altitude. As stated above, Lemley uses the earth's albedo to function. If the Lemley device were at the surface of the earth, it could not capture enough albedo to function; it must be high enough above the surface of the earth to use albedo to operate. In contrast, the Applicant's device will not work unless it is as close to the surface of the earth as possible or physically touching. Again the Examiner claims Lemley is covering a terrestrial object - at 70,000 feet. To contrast, if Applicant's device were at 70,000 feet, it would not help reduce thermal pollution because the infrared thermal energy has already left the terrestrial environment. Further, the Applicant's device would then be hampering the movement of infrared thermal energy away from the earth because it would be blocking deep space at 4K, therefore defeating its primary function. Accordingly, the Applicant's device will not work at 70,000 feet. Hence the Applicant's device will not function at the locale taught by Lemley, and the Lemley device will not function at the locale taught by Applicant. Therefore, it would not be obvious in the art at the time the invention was made to have expected the material of Lemley to provide the claimed properties by the Applicant.

Accordingly, it is respectfully submitted that claim 10 including claim 1 similarly claimed, defines over Lemley. Therefore, it is respectfully requested that the rejection to claims 1 and 10, including claims depending therefrom, i.e., claims 2-9 and 11-29, be withdrawn.

Claims 6, 7, 14, 16, and 24-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lemley as applied to claims 1, 3, 10 and 11 above, and further in view of Chang et al.

(5,405,680). Applicant respectfully traverses.

Claims 6, 7, 24, and 26 depend from claim 1, while claims 14, 16, and 26 depend from claim 10, both of which are submitted as being allowable for defining over Lemley as discussed above. Furthermore, it is respectfully submitted that substituting the material of Lemley with the material of Chang et al. does not cure the deficiencies noted above with respect to Lemley.

It is respectfully noted that Chang et al. teach a selective emissivity **coating that** is provided **for interior temperature reduction of an enclosure** such as vehicles or buildings. Col. 3, lines 47-49 and Abstract. The coating may be applied to the exterior surface of vehicle and building windows, or to the exterior, non-window surfaces of building structures. For the latter, the coating may take the form of a conventional paint to which is added tiny particles of the semimetal and selective emissivity materials to achieve the radiative cooling and reflection of incident infrared radiation. See Abstract. The material serves to reduce the **solar heat load** by reflecting the incident solar infrared radiation. Thus, Chang et al. teach a **fixed** coating applied to an object, such as a vehicle or building, to reduce the temperature of a closed space heated by **solar energy**. Chang et al. teach only reducing temperature in an enclosure resulting from solar energy.

In particular, Figure 4 of Chang et al. discloses a glass pane (with spectral properties) used to cool the interior of the vehicle from solar heating during the day while Figure 3 shows the roof of the vehicle with a special coating to cool the interior, again from solar heating during the day. However, the instant device of the present application cools the surrounding air that is heated by the exhaust, radiator, engine, etc., of the vehicle, not the interior of the car heated by the sun. The present device does not even have to be attached to the car to function as designed. Also, the present invention can be used at night. If the prior art device were used at night, the interior may become too cold, and the vehicle would be uncomfortable for the occupants. The instant device will not affect the interior of the vehicle. . . at least not immediately. It is respectfully submitted that the Examiner consistently and mistakenly equates the thermal load on a building or a vehicle from the sun with removal of waste heat created by man.

Chang et al. do not teach or suggest arranging a thermal energy transmitting material over an object not in direct sunlight, said thermal energy transmitting material configured and removably positioned to remove **waste heat** proximate and external said object thereby **reducing thermal**

pollution from a terrestrial position into deep space, as in Claim 1.

Therefore, it is respectfully requested that rejection with respect to Claims 1 and 10, including claims depending therefrom, i.e., Claims 2-9, 11-18, and 22-27, be withdrawn.

Claims 8 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lemley, and further in view of Chang et al. as applied to claim 1, 3, 7, 10 and 11 above, and further in view of Altman. Applicant respectfully traverses.

The Examiner alleges that Altman discloses a spectral substance (infrared radiation transmitting material) selected from the group consisting zinc sulfide and zinc selenide.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Chang et al. by using the spectral substance of Altman because Altman teaches a spectral substance that would have provide for a continuous, uninterrupted and unobscured flow of heat form a subject surface to a heat sink and through a heat conduit thereby improving the overall method for cooling a subject thermal load that emit infrared radiation.

It is respectfully noted that Claims 1 and 10 including claims depending therefrom, i.e., 8 and 17, respectively, define over Lemley alone and in combination with Chang et al. as discussed above. It is further respectfully noted that the use of the spectral surface of Altman does not cure the deficiencies noted above with respect to Lemley alone or in combination with of Chang et al. Thus, Claims 8 and 17 define over Lemley in view of Chang et al., and further in view of Altman.

Claims 15 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lemley as applied to claim 10 respectively, above, and further in view of Steams (3,053,921). Applicant respectfully traverses.

The Examiner admits that Chang et al. do not disclose that the thermal transmitting material is disposed within a pressure cell having a pressure less than ambient. It is respectfully submitted that Examiner meant to admit that "Lemley" does not disclose that the thermal transmitting material is disposed within a pressure cell having a pressure less than ambient. However, the Examiner states that Stearns in Figure 4 discloses thermal transmitting material (58

and 64 of aluminum) disposed within a pressure cell having a pressure less than ambient (gas-tight, transparent envelop 72). The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the device of Lemley by using the pressure cell of Stearns because Stearns discloses a pressure cell that would have prevented hot junctions from being cooled by convection thereby improving the overall performance of the method.

It is respectfully noted that Claims 15 and 23 depend from Claim 10, which is submitted as being allowable for defining over Lemley as discussed above. It is further respectfully noted that the use of pressure cell of Stearns does not cure the deficiencies noted above with respect to Lemley. Thus, Claims 15 and 23 define over Lemley in view of Stearns.

It is believed that the foregoing remarks fully comply with the Office Action. Therefore, having placed the claims in an allowable condition, reconsideration and allowance of claims 1-29 are respectfully requested.

If there are any charges with respect to this amendment, or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorneys.

Respectfully submitted,
RONALD J. PARISE

CANTOR COLBURN LLP
Applicant's Attorneys

By: _____
James J. Merrick
Registration No. 43,801

Date: November 30, 2004
Address: 55 Griffin Road South, Bloomfield, CT 06002
Telephone: (860) 286-2929
Customer No. 023413